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Nuclear latency and the future strategic environment

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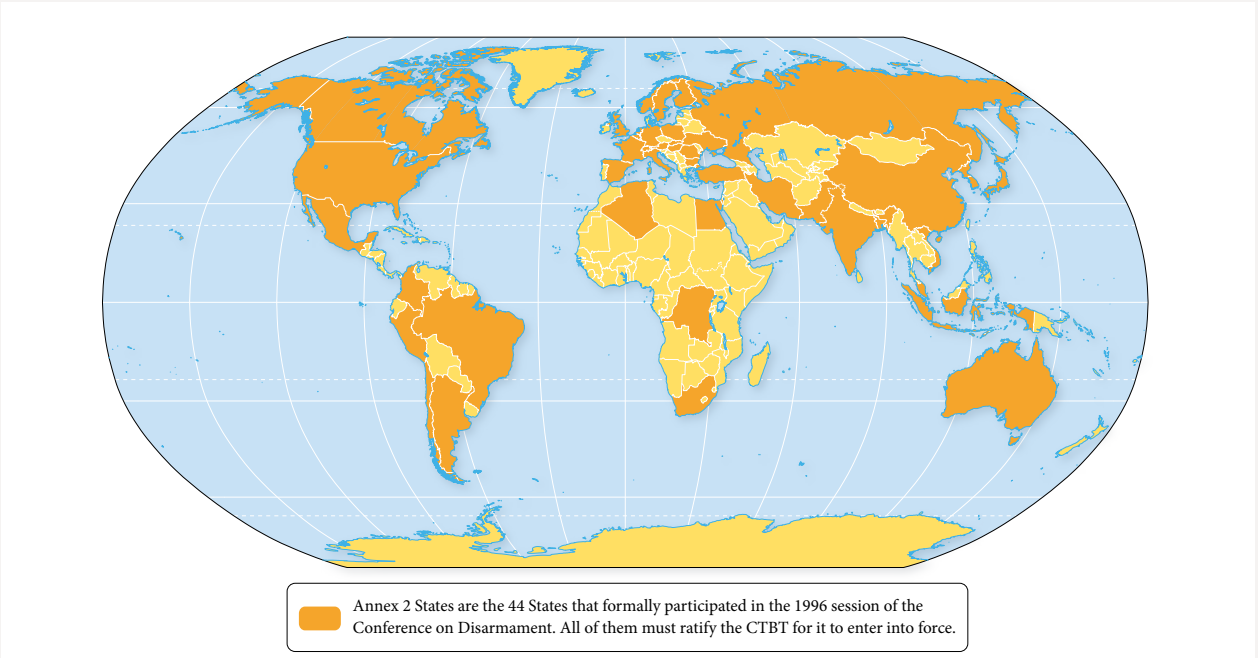
Executive summary

Since the 1946 'Report on the International Control of Atomic Energy' and the closely associated Baruch Plan formulated by the United States, 'nuclear latency'—put simply, the potential for countries to obtain nuclear weapons capability—has been a factor threatening to undermine strategic equilibrium on the world stage. The Nuclear Non-Proliferation Treaty and resulting nonproliferation regime may have allayed mid-20th century concerns about the rate of spread of nuclear weapons, but the notion of nuclear latency has by no means become obsolete. At the same time, due to the complexity of underlying issues, the term continues to be widely misinterpreted and misjudged. From a technology standpoint, the question of nuclear latency is complicated by the inherent duality of nuclear expertise—suitable both for nuclear weapons and for use in civil nuclear power programs. Accumulating a high level of nuclear capability under the guise of legitimate civilian programs may enable countries to maintain significant weaponisable knowledge without attracting a harsh backlash from the international community for having actually crossed the line. From a political and analytical

Figure 1: Comprehensive Nuclear-Test-Ban Treaty (CTBT) Annex 2 states



standpoint, therefore, understanding a country's motivations is critical. Arms control negotiators, the global analytical community and international nuclear watchdog agencies need a meaningful definition of nuclear latency that takes account of both capability and intent in order to develop a common understanding of the issue and deal with it effectively.

The list of 44 Comprehensive Nuclear-Test-Ban Treaty Annex 2 states, minus the number of recognised, de facto and assumed nuclear-weapon states, could be a reasonable shorthand roster of nuclear latency candidates. The possession of indigenous capabilities to run both open and closed nuclear fuel cycles successfully is the ultimate indicator of nuclear latency. With such experience, a country harbouring an entrenched sense of existential insecurity, having a history of clashes with its neighbours and seeking to gain more regional dominance and international prestige could make a decision to weaponise. Nuclear watchdogs and other entities, including intelligence services, must remain vigilant.

To explore the phenomenon in some detail, this paper examines the cases of the Republic of Korea and Japan. Latent nuclear technology alone doesn't result in nuclear proliferation—proliferation-related motivations, choices and decisions are required as well. Therefore, one useful way to analyse a country's proliferation decision-making is through the lens of 'technical capability + intent'. Prospectively, the main risk factor with the two Asian countries is their loss of confidence in the availability of a US nuclear umbrella. In contrast to the focus on indigenous nuclear programs in those nations, turn-key nuke acquisition may be more attractive to some countries in the Middle East. The nonproliferation community and intelligence services around the world will have to continue keeping an eye on the region's geopolitics.

Australia should continue supporting the global nonproliferation agenda in any way it can. This paper makes four key recommendations:

- If a nuclear security summit were to be scheduled for 2018, holding it in Australia would further strengthen Australia's standing in the world as an effective advocate for the responsible use of nuclear materials.
- The Asia–Pacific Safeguards Network is a promising venue for joint efforts seeking to shape the nuclear policy vector in nuclear-latent countries in the Pacific region.
- Australia should pursue a leadership position in a diverse group of states that contribute to the International Partnership for Nuclear Disarmament Verification proposed by the US in December 2014.
- Australia needs to continue its participation in annual Non-Proliferation and Disarmament Initiative meetings. Ensuring the effectiveness of this ministerial-level group, initiated by Australia and Japan, will consolidate Australia's nonproliferation leadership position in the region and in the non-nuclear-weapon states community as a whole.

Defining nuclear latency

In the 1960s, US President John F Kennedy was worried that within a few years there would be 20–30 countries with nuclear weapons. He feared that number would grow in line with the wider availability of the technical knowledge required to build them. The Nuclear Non-Proliferation Treaty and the resulting multifaceted nonproliferation regime may have allayed that concern, but the latent threat of nuclear proliferation remains a risk factor for international security.

Why is the issue of 'nuclear latency', as it is termed, important, and what practical utility does it have? For a long time, the practical consensus has been, 'Nuclear proliferation is unacceptable. If you proliferate, you're a bad actor and a threat to the international system.' To date, this view has shown an extraordinarily low propensity to change. So, to keep track of who could challenge the nuclear status quo, the international watchdogs—such as the Vienna-based International Atomic Energy Agency and the Comprehensive Nuclear-Test-Ban Treaty Organization—need to maintain a good handle on the global state of play with regard to individual states' weaponisable nuclear technologies. To do so, they require a common vocabulary and reliable, country-specific

baselines. The notion of nuclear latency meets both these needs by being universally applicable and capable of capturing country-level trends as they emerge.

A country's nuclear latency status is also a useful metric for thousands of arms control negotiators and disarmament professionals. As the nuclear-weapon states (NWS) community makes small but time-consuming steps towards 'nuclear zero', the notion of nuclear latency will gain increasingly greater relevance in the context of what's known as 'deterrence at lower numbers'. Put differently, as the total number of nuclear weapons in the world gets smaller, deterrence relationships among countries that possess them will change; so, too, will the far more complex assurance relationships with the nuclear powers' various regional allies. If and when that number reaches zero, a country's breakout potential will be the new metric to watch. At that point, significant nuclear latency will be code for the quickness and success of nuclear reconstitution.

All along, nuclear proliferation has been a field in which analytical judgement calls are frequent, but there are also certain ground truths that set the stage. It's true, for example, that in the world of nation-states, the decision by a country to transform an existing latent nuclear capacity into an operational capability can only come from its government leaders. It's also true that latent nuclear technology *alone* doesn't result in nuclear proliferation. Countries' motivations and intentions are an amalgamation of perceptions of insecurity, international prestige, domestic political pressures and bureaucratic turf battles among various factions and entities within their governments.

The utility of the concept

In order for the International Atomic Energy Agency, the Comprehensive Nuclear-Test-Ban Treaty Organization and other players to be able to prioritise their work across the world most effectively and spend their limited human and financial resources where it really counts, it's important that they keep in mind the following three points. First, the time required to complete the development of a nuclear weapon capability will be country-specific. Due to a number of factors, states with comparable industrial and technological bases will probably *not* cross the finish line at exactly the same time. Second, there's the perennial question of 'How many is enough?'—that is, how many nuclear weapons a nation would deem sufficient for its purposes. There may also be a gap between how many weapons a state wants and how many it can produce or obtain. Third, the current trends in nuclear arms control might, to a degree, shape the national security predilections of latent nuclear states and quell their nuclear arms aspirations—especially if the NWS show more of a heartfelt commitment to reducing their stockpiles and meeting their obligations under Article VI of the Nuclear Non-Proliferation Treaty in good faith. In this context, the February 2015 *Joint statement from the nuclear-weapon states at the London P5 Conference* is helpful in demonstrating the five nuclear powers' willingness to maintain continuity of work on all three pillars of the treaty—disarmament, nonproliferation and peaceful use of nuclear energy—in a regular forum.[1]

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In assessing proliferation risk, it's critical to understand that technical capabilities to build nuclear weapons don't always coexist with national security motivations to possess them. So, a *capability decision*, when a country sets out to develop and increase its latent capacity, is analytically distinct from a *proliferation decision*, when the ultimate goal is possession of at least one functional nuclear weapon.[2] A useful framework to analyse a country's proliferation decision-making is therefore that of 'technical capability + intent'.

Capability + intent

To be able to characterise the degree of nuclear latency of a particular country, national policymakers, international watchdog agencies and the global analytical community all need a meaningful definition of the phenomenon. Texas A&M's Dr DJ Sweeney, the developer of the recent Nuclear Weapons Latency Computational Tool, provides the following one. His definition takes into account the existence of different possible pathways and fits well with the 'technical capability + intent' construct. Sweeny states that nuclear latency is:

> the expected time to be taken by a non-nuclear weapons state to develop a conventionally deliverable nuclear weapon given the state's position on a path toward or away from a nuclear weapon and accounting for the state's motivations and intentions. Potential proliferation time is taken as a representation of the latent proliferation capacity of a non-nuclear weapons state.[3]

The number of countries that should be linked to the term 'nuclear latency' has been debated in the literature. The list of states with a *basic* level of interest in nuclear technology and its possible applications would be too expansive. In fact, if one sets the bar at the level of the 1940s industrial capability that successfully produced nuclear technologies, virtually all modern nations will have a non-zero nuclear latency. For insightful analysis, a more discriminating dataset is required. By most counts, the set of states with established *proficient* nuclear expertise comprises between 34 and 48 states, depending on one's criteria of proficiency.[4] For most analytical purposes, the 44 Comprehensive Nuclear-Test-Ban Treaty Annex 2 states,[5] minus the number of recognised, de facto and assumed NWS, would be a logical place to start counting nuclear latency candidates, see Table 1.

Table 1: Comprehensive Nuclear-Test-Ban Treaty: status of signature and ratification

State	Signature	Ratification	State	Signature	Ratification
Algeria*	15 October 1996	11 July 2003	Israel*	25 September 1996	
Argentina*	24 September 1996	4 December 1998	Italy*	24 September 1996	1 February 1999
Australia*	24 September 1996	9 July 1998	Japan*	24 September 1996	8 July 1997
Austria*	24 September 1996	13 March 1998	Mexico*	24 September 1996	5 October 1999
Bangladesh*	24 October 1996	8 March 2000	Netherlands*	24 September 1996	23 March 1999
Belgium*	24 September 1996	29 June 1999	Norway*	24 September 1996	15 July 1999
Brazil*	24 September 1996	24 July 1998	Pakistan*		
Bulgaria*	24 September 1996	29 September 1999	Peru*	25 September 1996	12 November 1997
Canada*	24 September 1996	18 December 1998	Poland*	24 September 1996	25 May 1999
Chile*	24 September 1996	12 July 2000	Republic of Korea*	24 September 1996	24 September 1999
China*	24 September 1996		Romania*	24 September 1996	5 October 1999
Colombia*	24 September 1996	29 January 2008	Russian Federation*	24 September 1996	30 June 2000
Democratic People's Republic of Korea*			Slovakia*	30 September 1996	3 March 1998
Democratic Republic of the Congo*	4 October 1996	28 September 2004	South Africa*	24 September 1996	30 March 1999
Egypt*	14 October 1996		Spain*	24 September 1996	31 July 1998
Finland*	24 September 1996	15 January 1999	Sweden*	24 September 1996	2 December 1998
France*	24 September 1996	06 April 1998	Switzerland*	24 September 1996	01 October 1999
Germany*	24 September 1996	20 August 1998	Turkey*	24 September 1996	16 February 2000
Hungary*	25 September 1996	13 July 1999	Ukraine*	27 September 1996	23 February 2001
India*			United Kingdom*	24 September 1996	06 April 1998
Indonesia*	24 September 1996	06 February 2012	United States of America*	24 September 1996	
Iran (Islamic Republic of)*	24 September 1996		Viet Nam*	24 September 1996	10 March 2006

Source: CTBTO Preparatory Commission, Vienna, online.

The Annex 2 states that participated in the negotiation of the treaty from 1994 to 1996 were considered 'nuclear capable' because they possessed nuclear power reactors or research reactors at that time. At the latest count in April 2014, commercial nuclear power reactors operated in 31 countries, and 56 countries ran research reactors.[6] These are master lists that can inform any substantive discussion about countries with *actionable* nuclear latency.

Among these countries, there's a smaller set of non-nuclear-weapon states (NNWS) with established nuclear programs (Canada, Japan, the Republic of Korea, Brazil, Romania, etc.). They engage in many or most of the following stages of the cycle: mining and milling; conversion; enrichment; fuel fabrication; and spent fuel management, including the ability to separate out plutonium in processes associated with reprocessing. With such experience, a country harbouring an entrenched sense of existential insecurity, having a long history of clashes with its neighbours and seeking to gain more regional dominance and international prestige could make a proliferation decision to weaponise. Nuclear watchdogs and other entities, including intelligence services, must remain vigilant.

Arguably, the easiest bet for most potential proliferants would be to focus on assembling a gun-type uranium-based nuclear device, even though, as North Korea has demonstrated, pursuing both uranium and plutonium routes in parallel is entirely possible. A basic gun-type device would be a far cry from a miniaturised and elegant thermonuclear warhead that's light and compact enough for long-distance delivery atop a ballistic missile or in a bomb that a fighter-bomber could drop, but the lowest qualifying hurdle will nonetheless be cleared. A long-range capability is simply not always necessary. In tight regional quarters, such as the Middle East, geopolitical archrivals may be separated by just a few hundred kilometres, and seeking a means of intercontinental delivery isn't such a high priority.

Decisions to proliferate

Proliferants seeking to become NWS will negotiate the obstacle course from 'device' to 'weapon' to 'delivery systems' to 'operationalization, including strategy and doctrine' according to their own threat perceptions, the amount of breathing room afforded by the international community, their freedom of access to raw materials, the availability of expertise, their industrial production capabilities and their financial resources.

However, given today's international nonproliferation and counterproliferation regimes, as well as the national intelligence capabilities that a number of major powers can bring to bear, any significant steps to develop nuclear weapons are bound to be detected eventually. From a strategic standpoint, therefore, every potential proliferant nation has to undertake a careful cost-benefit analysis and realise that there'll be hefty downsides to such a decision once the cat is out of the bag. As the Indian nuclear program has shown, it may not be out of the bag for a while. Secretive and highly compartmented, the program delivered the desired results while alerting very few along the way. Just the same, this secrecy-based approach required the Indians to overcome a few bumps in the road that probably wouldn't have been there if the effort had been overt (for example, policy planning was unaware of technical issues, training was ad hoc to the point of being cryptic, there were additional hurdles with platform–weapon integration that had to be cleared, and so on).

The circumstances in which any new entrant into the nuclear club will make a momentous decision to abandon the Nuclear Non-Proliferation Treaty may vary, but any such move will almost certainly have high reputational costs. A rather recent example is instructive. When Ukraine's Minister of Defence, Valeriy Heletey, suggested in September 2014 that his country might have 'to build these weapons' to curb the unfolding Russian aggression, several senior US Government officials made their disapproval clear. Most pointedly, Under Secretary of State for Arms Control and International Security Rose Gottemoeller said in a December 2014 interview that 'for Ukraine, the consequences of such a policy reversal would have been catastrophic.'[7]

East Asian actors

So, what states should be of most concern to Australia from the standpoint of nuclear weapons breakout potential? East Asia is home to two interesting cases of nuclear latency—Japan and the Republic of Korea (ROK). Entangled in a mesh of bilateral and

trilateral suspicions and general regional mistrust underpinned by decades of historical animosity, the neighbourhood is fertile ground for producing the next NWS.

South Korean negotiators have been incredulous that the US granted enrichment and reprocessing rights to neighbouring Japan, while being firmly unwilling to extend the same privileges to South Korea's nuclear industry.

The continuing US–ROK negotiations to renew the original 1974 '123 Agreement' may herald an overall push by South Korea to gain greater autonomy in making decisions about the direction and advancement of its nuclear technologies and know-how.[8] The current agreement limits its nuclear program to an open-ended fuel cycle. The main obstacle that complicates reaching the successor agreement has to do with the two countries' diverging views on the proliferation resistance of two dual-use technologies: pyroprocessing of spent nuclear fuel and enrichment of US-supplied uranium. This disagreement has a thorny diplomatic dimension as well. South Koreans believe that they've earned a spot among the most reliable partners of the US. Yet they see that the US isn't giving the ROK a consideration congruent with such a self-image. In fact, South Korean negotiators have been incredulous that the US granted enrichment and reprocessing rights to neighbouring Japan, while being firmly unwilling to extend the same privileges to South Korea's nuclear industry.

In addition to technical concerns about pyroprocessing and fears that the considerable commercial potential of enrichment services may lead to their unruly expansion and to lax enforcement of nonproliferation standards, the US may have worries about South Korean public opinion on the issue of weaponisation of nuclear technologies. Unlike in Japan, where that country's sense of 'nuclear allergy' manages to keep the issue close to the political fringe, popular views in South Korea about building the nation's own nuclear deterrent capability are more mainstream. Analysts have noted that more than half of the ROK population continues to support the nuclear weapons idea.[9]

Japan has a slightly different proliferation problem to work through. It's the only NNWS that sits on about 10 tons of separated reactor-grade plutonium, which could be used to make nuclear weapons. Even more troubling, it still possesses several hundred kilograms of weapons-grade plutonium that it received from the US and the UK in the past for use in fast reactor research.[10] Japan's neighbours continue to pedal these facts internationally and paint a variety of potential scenarios based on fear and zero-sum thinking. While the neighbours may have an ulterior motive to oversell their case, Japan's plutonium policies do, in fact, create nonproliferation concerns. Another aspect many informed observers point to is that, while Japan doesn't have a mainstream constituency for the bomb, it seems to have 'given insufficient consideration to regional security implications of domestic decisions' about its nuclear fuel cycle choices.[11]

False predictions about Japan's future as an NWS have a long history.[12] Regional challenges and crises in East Asia evolve and persist, but don't cross the line into the territory of an existential threat to Japan. Public opinion polls consistently show little support for a major overhaul of Japan's non-nuclear posture. Should Japan decide to build the bomb to feel more secure, it could end up knocking the dominos down in a completely undesirable direction. China, North Korea and Russia (with which Japan still has no formal peace treaty, but has a very public unresolved territorial dispute) are all likely to perceive such a move with great apprehension. Japan's current security safeguard, the US–Japan Security Treaty, has worked well for over 50 years. Barring a long series of acute regional crises, in which the US shows an undeniable lack of commitment to Japan's needs, or a massive US troop withdrawal from the region, Japan's more likely to continue, as it has, beefing up its conventional defence forces and enhancing its theatre missile defence system capabilities.

Confidence and credibility

If there's one factor that could build up a nuclear weapons constituency in either country, it's their loss of confidence in the stated and restated availability of a US nuclear umbrella to shield them from acts of aggression by a neighbour and to deter a further escalation of hostilities. As Russia's annexation of Crimea and escalation in eastern Ukraine have shown, there are limits to how much value some nation-states put on cornerstones of international law in a crisis. Few have questioned the nobility of goals and clarity of proclaimed benefits of nonproliferation policies, but will that consensus last much longer?

A credibility problem continues to plague the international nonproliferation regime. America's extended nuclear deterrence commitments often ring hollow and require a healthy dose of regular joint exercises, show-of-force flyovers and the whole panoply of less extravagant strategic communications, including strong statements of unwavering support from high offices across Washington DC. So far, this courtship ritual has worked for both Japan and the ROK.

The international community hasn't needed to test the disputable virtues of 'tolerable proliferation' in Northeast Asia, despite the fact that the two US allies have, on a few occasions, voiced legitimate concerns about the effectiveness and reliability of the current arrangement with the US. If those concerns were to become grave for either of the two countries (for example, if North Korea starts conducting nuclear tests every six months, escalates its inflammatory rhetoric and continues with regular provocations along the border and close to territorial waters of the ROK), could the nuclear-proliferation-is-unacceptable mantra be put aside to make a 'special exception'? The slippery-slope argument and the nuclear weapons usability paradox[13] will weigh heavily over whoever has to ponder this dilemma. Defence analysts may need to reassess the pros and cons of implementing a NATO-like nuclear sharing arrangement in East Asia, whereby the US puts its non-strategic nuclear weapons in those countries, as opposed to relying on its long-range assets deployed on the American mainland and on Guam. However, that option won't come without a hefty price. It wouldn't be cheap to ensure proper physical protection of the arsenal against aggressive attempts at infiltration, sabotage and theft by operatives from across the Korean border.

In contrast to the focus on indigenous nuclear programs in Japan and ROK, talk about purchasing a turn-key nuke seems to be more prominent in the Middle East. The international-drama factor surrounding Iran's nuclear program and contributing to the discomfort of Iran's Sunni neighbours doesn't help. As emotions flare up on the Arabian peninsula, countries such as Saudi Arabia feel compelled to explore policy options for countering the impending 'Shia bomb' and maintaining a fragile balance of influence in the region. The expectation is, perhaps, that Pakistan could lend a helping hand with the weapon,[14] and the Saudis will only have to determine a suitable deterrence posture and the timing and modality of communicating it to key external audiences, including Iran, the US and the international community as a whole.

Another vastly important consideration for the Middle East is that, even if the ongoing P5+1 effort to curb the Iranian nuclear program is successful, the country will remain the most advanced nuclear-latent player in the region for at least the next decade. Again, the international nonproliferation community and intelligence services around the world will have to continue keeping an eye on the turbulent geopolitical dynamics in the neighbourhood.

What Australia should do

One defining feature of the future strategic landscape will be that the gap between the number of countries that could conceivably assemble a viable nuclear weapons program and the number of those that have done so will keep getting wider. What, specifically, can Australia do to ensure that this trend continues in the longer term, both globally and in the Asia–Pacific region? Here are several practical policy recommendations.

In response to one particular class of proliferator (non-state actors, including terrorists), the global community needs to continue the practice of holding nuclear security summits, since the most fundamental stated goal of this biannual summitry—securing all weapons-grade materials around the world by 2014—has yet to be achieved. The US, Asia and Europe have each hosted one such summit; the US is planning to do so again in 2016. If a summit were to be scheduled for 2018, holding it in Australia would benefit

the cause of nonproliferation by expanding the geographical reach of nonproliferation leadership. It would also further strengthen Australia's standing as an effective advocate of the responsible use of nuclear materials.

Another promising venue for joint efforts to shape policy in nuclear-latent countries in the Pacific region is the Asia–Pacific Safeguards Network. It was established in 2009 to strengthen nuclear safeguards through practical regional cooperation, technical assistance and knowledge management. Since the network's inception, a flurry of regional nonproliferation and nuclear security initiatives has followed in several member states, including South Korea and Japan. As a forum for exchanging ideas and holding professional discussions that inform domestic nuclear debates in individual member states, the Asia–Pacific Safeguards Network could be invaluable.

More effective intelligence sharing also needs to be leveraged to close existing intelligence gaps, especially to provide strategic warning about North Korea's intentions and planning. In late 2014, the ROK, Japan and the US signed a trilateral agreement on sharing intelligence about Pyongyang's increasing nuclear and missile threats.[15] Until then, South Korea and Japan each had stand-alone bilateral intelligence-sharing agreements with the US; the current provision now allows South Korean or Japanese intelligence information to flow to the US and on to the other party. While the substantive benefits of such a pact may take some time to emerge, the arrangement signals a change in the national security landscapes in South Korea and Japan and a greater bilateral commitment to working together. The trilateral agreement also builds—at least in the medium term, while the three countries test-drive their new intelligence relationship—on a whole spectrum of other US politico-military efforts to keep South Korea and Japan in their NNWS status.

...Australia should pursue a leadership position in a diverse group of states with significant technical expertise in nuclear science that have supported, or will support, the International Partnership for Nuclear Disarmament Verification proposed by the US in December 2014.

Given its trusted middle-power status and its interest in regional stability, Australia should pursue a leadership position in a diverse group of states with significant technical expertise in nuclear science that have supported, or will support, the International Partnership for Nuclear Disarmament Verification proposed by the US in December 2014. The partnership envisions a cooperative engagement between NWS and NNWS designed to bring creative solutions to some of the more complex problems in nuclear disarmament verification.[16] These challenges exist at all stages of a nuclear weapon's lifecycle: material production and control, warhead production, deployment, storage, dismantlement and disposition. For a NNWS, Australia possesses a remarkable body of knowledge in various nuclear applications and boasts a solid reputation as a consistent nonproliferation advocate. Its intellectual contributions will broaden the discussion and help in producing techniques and know-how able to address future verification and monitoring challenges. Such an outcome will be to the benefit of all countries. Australia's intelligence community needs to stand ready to take full advantage of the increased situational awareness and additional analytical scrutiny that this expanded intelligence-sharing relationship intends to produce.

In a similar way, being a US ally enjoying the protection of the American nuclear umbrella doesn't, and shouldn't, mean that Australia can't be a more forceful advocate for nuclear disarmament. Australia needs to continue its participation in annual Non-Proliferation and Disarmament Initiative meetings and step up the coordination of the initiative's priorities and agenda with the substantively similar P5 conferences held regularly by the NWS. By staying engaged in a range of contemporary nuclear issues, promoting International Atomic Energy Agency safeguards and appropriate export controls and increasing the transparency of nuclear information, this ministerial-level group initiated by Australia and Japan will consolidate Australia's leadership nonproliferation position in the Asia–Pacific region and in the NNWS community as a whole. Such complementarity of NWS and NNWS efforts would be a welcome sign of the universality of nonproliferation norms.

Finally, it's noteworthy that the recent move by the South Australian Government to examine nuclear industry development options would contribute significantly to Australia's own nuclear latency. In early February 2015, the state renewed public debate about the scope and scale of domestic nuclear services by announcing the establishment of a royal commission to assess options to expand South Australia's nuclear-related activities. The royal commission will examine the possibility of moving into such areas of the nuclear fuel cycle as uranium enrichment and spent nuclear fuel storage. This announcement has come at a time when the global nuclear industry is taking an introspective look at the sustainability of its own economic, environmental and safeguards targets. It will be interesting to see whether any new solutions and mechanisms for their implementation (compared, for example, with the 2006 'Switkowski report') will be offered to address the domestic nuclear waste situation, and whether the option of repatriating spent fuel made from Australian uranium will get greater traction this time around than it did decades ago. Today, Australia could offer reliable safeguards for the spent fuel and enjoy a financial benefit from such an arrangement.

Some further questions related to nuclear latency remain open. For example, is there a likely 'window of opportunity', during which most countries that have acquired the necessary latent capacities will make a proliferation decision? What avenues would future latent proliferants prefer to use to acquire the manufacturing, engineering and computational expertise needed to build a functional nuclear weapon?

Those questions are waiting for innovative analyses, skilful diplomacy and cogent and informed policymaking. Australia should continue making contributions in all these areas and supporting the global nonproliferation agenda in any way it can.

Acronyms and abbreviations

CTBT Comprehensive Nuclear-Test-Ban Treaty

NATO North Atlantic Treaty Organization

NNWS non-nuclear-weapon state/s

NPT Nuclear Non-Proliferation Treaty

NWS nuclear-weapon state/s

ROK Republic of Korea

Notes

1 US Department of State, *Joint statement from the nuclear-weapon states at the London P5 Conference*, 6 February 2015, online.

2 See, for example, SM Meyer, *The dynamics of nuclear proliferation*, University of Chicago Press, Chicago and London, 1984), 1 and 5.

3 DJ Sweeney, 'Nuclear weapons latency', PhD dissertation, Texas A&M University, 2014, online.

4 See, for example, SD Sagan, 'Nuclear latency and nuclear proliferation', Stanford University Press, Stanford, July 2010, online; or Meyer, *The dynamics of nuclear proliferation*, 42–43 and 76.

5 The signature of, and ratification by, these 44 states are required for the treaty to enter into force globally.

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9 P Iglauer, 'Nuclear weapons for South Korea', *The Diplomat*, 14 August 2014, online.

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11 See, for example, M Halperin and Y Kawaguchi, *Security implications of the nuclear fuel cycle: challenges of the nuclear fuel cycle*, Center for Nonproliferation Studies, October 2014, online. A similar theme is explored by Jeffrey Lewis in 'Japan has enough plutonium to make thousands of nukes: Tokyo doesn't want the bomb, but it doesn't know what to do with the fuel stockpile', *Foreign Policy*, December 2014, online.

12 For details, see WC Potter and G Mukhatzhanova (eds.), *Forecasting nuclear proliferation in the 21st century: the role of theory*, 1st ed., Stanford University Press, Stanford, 2010.

13 A Carnesale, P Doty, S Hoffmann, SP Huntington, JS Nye Jr, SD Sagan, D Bok, *Living with nuclear weapons*, Harvard University Press, Boston, 1983, 34. The authors define the phenomenon in the following way: 'Nuclear weapons can prevent aggression only if there is a possibility that they will be used, but we do not want to make them so usable that anyone is tempted to use one.'

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15 Song Jung-a, 'US, Japan and South Korea to share intelligence on North Korea', *Financial Times*, 26 December 2014, online.

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Important disclaimer

About the author

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